



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech/CSE(O)/IT(O)/SEM-5/CS-501/2012-13  
2012**

**OPERATING SYSTEM**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :  
10 × 1 = 10

- i) A multi-user, multiprocessing operating system cannot be implemented on hardware that does not support
  - a) address translation
  - b) DMA for disk transfer
  - c) at least two modes of CPU execution ( privileged and non-privileged )
  - d) demand paging.
- ii) A benefit of the microkernel organization is
  - a) extensibility
  - b) portability
  - c) flexibility
  - d) all of these.



- iii) The technique of gradually increasing the priority of a process that wait in a system for a long time is known as
- a) blocking
  - b) ageing
  - c) starvation
  - d) convoy effect.
- iv) Which of the following reduces degree of multiprogramming ?
- a) Long-term scheduler
  - b) Mid-term scheduler
  - c) Short-term scheduler
  - d) All of these.
- v) A critical section is a program segment
- a) which avoids deadlock
  - b) which should run in a certain specified amount of time
  - c) which shared resources that are accessed
  - d) which must be enclosed by a pair of semaphores operation,  $p$  and  $v$ .
- vi) A computer system has 6 tape drives, with  $n$  processes competing for them. Each process may need 2 tape drives. The maximum value of  $n$  for which the system is guaranteed to be deadlock free is
- a) 6
  - b) 5
  - c) 4
  - d) 3.



- vii) Banker's algorithm solves the problem of
- a) deadlock avoidance      b) context switching
  - c) deadlock recovery      d) mutual exclusive.
- viii) An address generated by the CPU is commonly referred to as
- a) logical address      b) physical address
  - c) relational address      d) virtual address
- ix) Which of the following page replacement algorithms suffers from Belady's anomaly ?
- a) Optimal replacement      b) FIFO
  - c) LRU      d) Both (a) and (c).
- x) Which of the following RAID levels implements some form of parity calculations to introduce redundancy ?
- a) RAID Level 2      b) RAID Level 4
  - c) RAID Level 6      d) All of these.
- xi) The time to move the disk arm to the desired cylinder in a hard disk is known as
- a) Rotational latency      b) Positioning time
  - c) Indexed      d) Hashed.



**GROUP - B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. a) What is race condition ?  
b) Explain Peterson solution for avoiding race condition.  $2 + 3$
3. a) Why are page sizes always power of 2 ?  
b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.  
i) How many bits are there in the logical address ?  
ii) How many bits are there in the physical address ?  $3 + 2$
4. What are co-operating processes ? Discuss the advantages of co-operating process.  $2 + 3$
5. What is priority scheduling ? Can SJF scheduling be considered as priority scheduling ? Justify.  $3 + 2$

**GROUP - C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

6. a) What is context switching ? Why is it considered to be an overhead ?  $2 + 2$   
b) All unused states may not lead to deadlock.  
“Why or why not” ?  $3$



c) Consider the following set of processes, with the length of the CPU-burst time given in millisecond :

<b>Process</b>	<b>Burst Time</b>	<b>Arrival Time</b>	<b>Priority</b>
$P_1$	10	0	3
$P_2$	1	1	1
$P_3$	2	2	3
$P_4$	1	2	4
$P_5$	5	3	2

- i) Draw 2 Gantt charts. Illustrate the execution of these processes a non-pre-emptive priority ( a smaller priority number implies a higher priority ) and a RR ( quantum = 1 ) scheduling.
- ii) What is turnaround time of each process for each of the scheduling algorithms ? Also find the average turnaround time of the system ?
- iii) What are the average waiting time for 2 algorithms ? 3 + 1 + 1
- d) Mention one characteristic each of time sharing system, Batch processing system and distributed system. 3



7. a) Differentiate between multiprogramming and multitasking OS. 2
- b) What is semaphore ? What are the different types of semaphore ? 2 + 3
- c) What is the Dining philosopher problem ? Device an algorithm to solve the problem using semaphore. 3 + 3
- d) Differentiate between starvation and deadlock. 2
8. a) What are TLB ? Draw the diagram of paging hardware with TLB. 1 + 2
- b) i) Consider a paging system with the page table stored a paged memory reference take.
- ii) If we add TLBs and 75 per cent of all page-table references are found in the TLBs what is the effective memory reference time ? ( Assume that finding a page table Entry in the TLBs takes zero time, if the entry is there. ) 2 + 2
- c) Given memory partitions of 100 kb, 500 kb, 200 kb and 600 kb ( in order ), how would each of the first fit, best-fit and worst-fit algorithms place process of 212 kb, 417 kb, 112 kb and 426 kb ( in order ) ? Which algorithm makes the most efficient use of memory. 2
- d) What is dynamic loading ? What is dynamic linking ? 3 + 3



9. Write short notes on any *three* of the following : 3 × 5

- a) RR scheduling
- b) DMA and its utility
- c) RAID
- d) Middle term scheduler
- e) Linked file allocation technique
- f) Boot block and bad block.

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